

REMARKS

Careful consideration has been given by the applicants to the Examiner's comments and rejection of various of the claims, as set forth in the outstanding Office Action, and favorable reconsideration and allowance of the application, as amended, is earnestly solicited.

Applicants gratefully note the Examiners indication in the Office Action that at least Claim 6-15 are deemed to be allowable if rewritten to overcome the rejection under 35 U.S.C. §112, second paragraph and to include the limitations of the base claim and any intervening claims.

Concerning the Examiners rejection of the remaining claims as set forth in the Office Action, Applicants note that Claim 1, 2 and 5 have been rejected under 35 U.S.C. §102(a) as being anticipated by French Patent No. 1,251,296; Claim 16 has been rejected under 35 U.S.C. §103(a) as being unpatentable over the French Patent in view of Li, U.S. Patent No. 5,937,966 as detailed in the Office Action and various other publications as previously cited are considered to be of interest.

Accordingly, in order to place the application into substantial order for allowance, appropriate amendments have been implemented to the claims wherein cognizance have been taken with regard to the informalities set forth in paragraph 1 of the Office Action, and Claim 1 has been amended to incorporate the limitation of Claims 11 and 12.

Furthermore, Applicants have herewith also presented a new Claim 17 comprising a combination of original Claim 1 including Claim 5 and allowable Claim 6, with various of the remaining claims also being dependent therefrom, whereby in essence all of the claims are deemed to be directed to allowable subject matter.

However, primarily for purposes of completeness, and setting forth the distinctions over the art, irrespective as to whether the latter is considered singly or in combination, Applicants submit as follow:

French Patent No. 1,251,296 discloses a hydraulic steering system with two steering piston-cylinder devices 6-12 and a variable, reversible hydraulic pump 1, that is responsive to an input device (steering wheel 4) connected to both cylinders in a closed circuit. The two steering cylinders (actuators) are interconnected crosswise as in the application, however, there is no disclosure an adjusting valve, whose first input port is connected to the high-pressure port of a feed pump whose second input port is connected to a hydraulic tank and whose first output port is connected to a second adjusting pressure chamber of the variation device.

Li, U.S. Patent No. 5,937,966 pertains to a power steering system for construction equipment comprising left and right steering cylinders, an oil pump for discharging pressurized oil for the two cylinders, a directional control valve provided with a movable spool for controlling the pressurized oil for the two cylinders and a power transmission unit for transmitting the rotating force of a steering column to the spool of the valve while converting the rotating motion of the column into a linear movement of the spool.

Nevertheless, there is no mention of an adjusting valve, whose first input port is connected to the high-pressure port of a feed pump whose second input port is connected to a hydraulic tank, whose first output port is connected to a first adjusting pressure chamber of a variation device and whose second output port is connected to a second adjusting pressure chamber of the variation device. Accordingly, the output ports of the adjusting valve disclosed in Li are directly connected to the steering cylinder.

Reverting to the art considered to be technological background material, applicants note:

Bohner, U.S. Patent No. 5,953,978 discloses a hydraulic power steering system for motor vehicles, in the case of which the manual steering wheel is normally connected only by way of a control system with respect to the drive with a servomotor operating the steered vehicle wheels. In the event of a malfunctioning of the control system, a forced hydraulic coupling is automatically established between the servomotor and a hydraulic delivery unit, the latter of which is constantly positively coupled with the steering handle in order to form a so-called "hydraulic linkage".

Hereby, Bohner illustrates (3) three valves, as shown in Figure 1. Although adjusting valve 16 has a first input port which is connected to the high-pressure port of a feed pump, and also has a second input port which is connected to a hydraulic tank, the adjusting valve has no first output port which would be connected to a first adjusting pressure chamber of a variation device and has no second output port, which is connected to a second adjusting pressure chamber of the variation device, in that the first and second output ports of the adjusting valve 16 are connected to the adjusting valve 7. The adjusting valve 7 has a first output port which is connected to a first adjusting pressure chamber of a variation device and a second output port which is connected to a second adjusting pressure chamber of the variation device, however, adjusting valve 7 has no first input port which would be connected to the high-pressure port of a feed pump and has no second input port, which is connected to a hydraulic tank. Adjusting valve 26 has only one output port connected to a tank and only one output port which is connected to the adjusting valve 7.

Wittren, U.S. Patent No. 4,367,803 describes a hydrostatic power steering system with constant volume feedback compensation including first and second steering cylinders, wherein each cylinder has a housing containing a piston with an attached piston rod extending through one end of the housing, and wherein the pistons and piston rods form a head chamber and two feedback chambers with each of the cylinders. The outer ends of the piston rods are connected to a pair of steerable wheels and also to each other by a mechanical link which allows the piston rods to move simultaneously; moreover, also present is a control valve which selectively controls the passage of a pressurized fluid from a supply source to a head chamber of either of the cylinders. The cylinders, which have their feedback chambers connected together for fluid flow, are manually operated by a steering wheel which actuates a metering pump connected across the fluid passages, such that, as steering wheel is turned, the fluid is transferred among the various chambers of the steering cylinders causing the piston rods to extend and retract, thereby turning the wheels. Wittren further discloses an adjusting valve that has a first input port which is connected to the high-pressure port of a feed pump and has a second input port, which is connected to a hydraulic tank. However, not disclosed in Wittren is that the adjusting valve has a first output port, which is connected to a first adjusting pressure chamber of a variation device and has a second output port which is connected to a second adjusting pressure chamber of the variation device, and wherein the first and second output ports in Wittren are directly connected to the steering.

Carlson et al., U.S. Patent No. 3,370,422 disclose a vehicle steering control system having a steering control adapted to develop hydraulic fluid flow to the steering actuators at a rate proportional to the rate of movement the steering control means. Hydraulic feed-back means are provided to neutralize the flow of steering fluid upon a steering movement of the

vehicle, in that Carlson, et al. contemplates providing a steering system in which there are arranged hydraulic actuators for turning the vehicle at a rate determined by the speed at which the operator turns the manually controlled steering member, such as the steering wheel. To obtain this, there is provided an infinitely variable displacement pump for delivering fluid at a desired rate to the hydraulic steering actuators, thus enabling the actuators to be driven and the vehicle to be turned at any desired rate, while a control system positions the displacements of the variable displacement pump to achieve any desired steering rate.

The two steering cylinders (actuators) are interconnected crosswise in a closed hydraulic circuit; whereby, when the operator turns the steering wheel to the right, a steering pump delivers fluid to a servo-motor at a rate determined by the rate of movement of the steering wheel, such that this results in the movement of a piston rod to the right increasing the displacement of a hydraulic unit in one direction to deliver fluid through conduit to two actuators, thereby effecting the rightward steering movement of the vehicle. However, without any follow-up action, the steering movement will continue until the operator returns the steering wheel so that a servomotor (i.e., variation device) moves back to its neutral position. The operation is identical upon the leftward steering movement just as well, except that fluid is ported through a first conduit and returned through a second conduit, and the faster the operator moves the steering wheel, the faster is the movement of a swashplate member, with the result being a greater vehicular steering rate.

There is no disclosure of an adjusting valve, whose first input port is connected to the high-pressure port of a feed pump whose second input port is connected to a hydraulic tank whose first output port is connected to a first adjusting pressure chamber of a variation device

and whose second output port is connected to a second adjusting pressure chamber of the variation device.

Niedermeier, et al., U.S. Patent No. 3,554,312 disclose a steering system for an articulated vehicle of the "off-highway" type including tractor and trailer units that are pivotally connected for wagon-like steering movement about a vertical axis through the actuation of hydraulic cylinders that are connected between the units. In order to facilitate a fine control of the steering system, a variable displacement pump is provided to motivate the hydraulic cylinders at an infinitely variable rate; while additionally, cam means are positioned between a manually operable steering control and the pump, whereby movement of the steering control means through one increment of movement results in an increased displacement and output of the pump, and in an increased rate of steering change relative to other similar increments of movement.

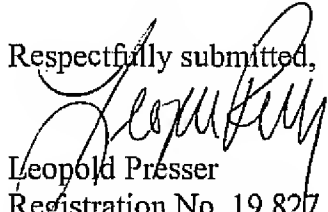
Niedermeier, et al. also fail to disclose that the adjusting valve has a first input port which is connected to the high-pressure port of a feed pump and has a second input port which is connected to a first adjusting pressure chamber of a variation device and that has a second output port, which is connected to a second adjusting pressure chamber of the variation device.

In summation, Applicants respectfully submit that Claim 1, as amended by incorporating the subject matter of Claim 11 and 12, and which is deemed to be directed to allowable subject matter, and Claim 17 which also incorporates the subject matter of Claim 1 including Claims 5 and allowable Claim 6, are both directed to clearly allowable subject matter wherein the hydraulic system pursuant to the present invention unambiguously and patentably distinguishes over the references of record.

Accordingly, predicated upon the foregoing, which essentially presents claims deemed to be directed to allowable subject matter, as also set forth in the Office Action, the early issuance of the Notice of Allowance by the Examiner is earnestly solicited.

However, in the event that the Examiner has any queries concerning the instantly submitted Amendment, applicants' attorney respectfully requests that he be accorded the courtesy of possibly a telephone conference to discuss any matters in need of attention.

Respectfully submitted,



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